State of California
AIR RESOURCES BOARD

Research Screening Committee

Cal/EPA Headquarters Building
1001 I Street
Conference Room 510
Sacramento, California 95814
(916) 445-0753
December 14, 2006
9:00 a.m.

ADVANCE AGENDA

Interagency Proposals

1. "Spatiotemporal Analysis of Air Pollution and Mortality in California Based on the American Cancer Society Cohort," University of California, Berkeley, $749,706, Proposal No. 2624-254

California currently has no statewide studies assessing death resulting from air pollution in the general population. This study will derive assessments of the health effects from particulate and gaseous air pollution on all-cause and cause-specific death in California based on the American Cancer Society Cohort. The investigators will examine whether specific particle characteristics are associated with larger health effects to different particle constituents and sources of exposure; and will determine how critical is time, duration, and level of air pollution exposure in contributing to death in California. This study will also increase our understanding of specific source contributions to death by studying the effects from expressways and ports. This study will supply the first California-wide estimates of death associated to PM2.5 exposure and other co-pollutants derived from a representative adult California population, thus supplying the Air Resources Board (ARB) with a valuable resource for deriving benefits estimates. This information will help strengthen ARB's efforts to implement policies that protect public health.

2. "An Investigation of Offshore Ship Emissions of CO, NO_X, and SO_X from Shoreline Measurements and a Survey of Vessel Operations," University of California, Davis, $49,560, Proposal No. 2621-254

Emissions from ships have the potential to substantially influence air quality in and downwind of coastal regions. This proposal would employ a multi-pronged approach to provide information on ship activity and emissions offshore of Bodega Bay. Ambient monitoring of pollutants and meteorology would detect ship plumes and data analysis of the aerometric data would be combined with vessel activity data to construct a regional assessment of the ship emissions in the coastal waters. These results would be

compared with an existing "bottom-up" estimate of ship emissions to provide constraints and guidance for future research. The results from this project are important for Central California air quality planning efforts as air quality modeling results are sensitive to background and initial concentrations of pollutants in the upwind side of the modeling domain.

3. "Emissions of HFC-134a from Auto Dismantling and Recycling," Foundation for California Community Colleges, $159,577.97, Proposal No. 2623-254

The project should produce a reliable upper bound on the annual amount of HFC-134a (a potent greenhouse gas) that is available for recovery in vehicles that are dismantled or salvaged in California. Also, it should quantify the vehicles that are dismantled annually in California and characterize them by age, type, reason for retirement, and any distinction among various vehicle categories in the amount of refrigerant available for recovery. The staff needs the information to determine the potential value of using ARB's resources to assist the U.S. EPA in enforcing a federal regulation. That regulation requires dismantlers and salvagers to recover refrigerant before they breach the air conditioning systems of vehicles. State assistance to the U.S. EPA in enforcing refrigerant recovery is a proposed Greenhouse Gas Reduction Strategy in California's Climate Change Protection Plan.

Sole Source Proposal

4. "Inventory of Direct and Indirect GHG Emissions from Stationary Air Conditioning and Refrigeration Sources, with Special Emphasis on Retail Food Refrigeration and Unitary Air Conditioning," ARMINES, $225,059.95, Proposal No. 2622-254

Millions of stationary refrigeration and air conditioning (RAC) systems exist in California, ranging from small, hermetically sealed residential refrigerators to large, supermarket direct expansion (DX) refrigeration systems containing thousands of pounds of refrigerant. Emissions from RAC systems are categorized as direct refrigerant emissions (typically high global warming potential [GWP] ozone depleting substances [ODS[1]] or hydrofluorocarbons [HFCs]) and indirect emissions (CO_2 emissions resulting from equipment energy use). The purpose of the proposed research is to generate a California-specific equipment and refrigerant inventory and energy use data to estimate the following: 1) past, present, and future direct GHG emissions and banks[2] from defined stationary RAC systems, 2) current indirect GHG emissions from retail food systems, and emissions reductions associated with energy saving strategies, and 3) future direct and indirect emissions, as well as life cycle climate performance (LCCP), from advanced design retail food systems. These data will enable ARB to develop the necessary rules, regulations, and/or voluntary measures to implement AB 32, which mandates the reduction of CO_2-equivalent GHG emissions in California to 1990 levels by the year 2020.

[1] CFCs and HCFCs.

[2] Banks are the total amount of substances contained in existing equipment, chemical stockpiles, foams and other products not yet released to the atmosphere.

Contract Augmentations

5. "Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort," Department of Health Services, Contract No. 03-313

The "Air Pollution and Cardiovascular Disease in the California Teachers Study (CTS) Cohort," was funded by ARB in 2004 to study the effects of chronic exposure to air pollution among women. This study demonstrated that long-term exposure to PM2.5, CO, and NO_2 was associated with heart attacks and stroke, as well as re-affirming the strong and consistent relationship between PM2.5 and death. The augmentation proposed for this study will extend these analyses by examining several unanswered questions such as susceptible subgroups, critical time windows of particulate matter exposure to specific disease categories (ischemic heart disease, cerebrovascular disease, lung cancer, and nonmalignant respiratory disease), effects in never-smokers, specific cardiovascular causes of death, associations with PM2.5 constituents, and re-examine the relationships between several traffic metrics and cardiopulmonary outcomes by modeling the effects of extremes of traffic metric distributions. This proposed augmentation will be important for the next review of ambient air quality standards for PM, and possibly for several gases, in California and at the federal level.

Draft Final Reports

6. "Air Pollution and Cardiovascular Disease in the California Teachers Study Cohort," Department of Health Services, $188,022, Contract No. 03-313

The California Teacher Study (CTS) is an ongoing cohort study of over 100,000 female school teachers. The investigators developed estimates of long-term air pollution exposure at the subjects' residences and examined associations between these exposure estimates and the health outcomes on total death, cardiopulmonary death, and incidence of both fatal and non-fatal heart attacks and stroke. In this study the CTS participants' addresses were linked with monthly estimates of PM2.5, PM10, and several gases including ozone, carbon monoxide, and nitrogen dioxide. They found strong and consistent associations between PM2.5 not only with total and cardiopulmonary death, but also with the incidence of heart attacks and stroke. They also identified somewhat less consistent relationships between one or more of these adverse outcomes and PM10, CO, NO_2 and ozone. This study provides additional evidence that long-term exposure to air pollution is associated with death, and demonstrates as well that exposure to several combustion-related pollutants is associated with the incidence of new cases of heart attacks and stroke.

7. "Survey of the Use of Ozone-Generating Air Cleaners by the California Public," University of California, Berkeley, $99,997, Contract No. 05-301

Increasing numbers of portable indoor air cleaning devices that emit ozone, either intentionally or as a by-product of the ionizing technology used to remove particles, are being sold in California, primarily through Internet sales and direct marketing. However,

lack of accurate, publicly available data on the prevalence of ownership of ozone-generating air cleaners in California has hampered the ARB's ability to assess the full health impact of these devices. The objective of this survey was to estimate the prevalence of air cleaner ownership in California, with an emphasis on ozone-generating air cleaners, and to learn how the devices are used, and other related information. Results of the statewide, representative telephone survey of 2,019 Californians conducted by the investigators showed that about 14 percent of California households own a portable indoor air cleaner. About two percent own an air cleaner that intentionally emits ozone, and another eight percent own electrostatic precipitators or ionizers, which may emit ozone as a by-product. An estimated 828,000 Californians reside in households with an intentional ozone generator; based on research results, those individuals are likely to experience exposure to unhealthful levels of ozone. The investigators also found that a significant portion of air cleaner owners operate their units continuously, adding to concerns regarding exposure to elevated ozone levels. The results of this project provide useful information for educating the public, and support the need for regulation of ozone emissions from indoor air cleaners.

8. "Investigation of Atmospheric Ozone Impacts of Selected Pesticides", University of California, Riverside, $99,850, Contract No. 04-334

Volatile organic compounds (VOCs), along with oxides of nitrogen, are known precursors to ozone formation and pesticides are a significant source of VOCs in many agricultural areas of California (e.g., San Joaquin Valley). However, the ozone impacts of most of the VOCs used in pesticides were unknown. To develop VOC control strategies for ozone attainment in these areas, improved understanding of the ozone impacts (i.e., reactivity) of pesticides is needed by the ARB and the California Department of Pesticide Regulation (DPR). The objective of this project was to develop methods for estimating and quantifying ozone impacts for major pesticides. This was accomplished by conducting smog chamber experiments and airshed model simulations for representative pesticides. The experimental results obtained were employed to develop gas-phase chemical mechanisms, which were then used to derive quantitative ozone impacts in reactivity scales such as Maximum Incremental Reactivity (MIR). This project was successful in meeting its objective of reducing uncertainties in atmospheric impacts of many types of pesticide-related VOCs used in California and resulted in quantitative estimates of ozone impacts of most of the chemicals in the California pesticide emissions profile. In addition, relative PM impacts of these compounds were assessed. The outcome of this project can help ARB and DPR significantly improve our understanding of pesticides' role in ozone formation in agricultural areas and then further improve control strategies for VOC emissions.

9. "Monitoring and Modeling of Ultrafine Particles and Black Carbon at the Los Angeles International Airport," University of California, Los Angeles, $117,986, Contract No. 04-325

Exposure to ambient particulate matter (PM) poses serious health concerns in California, with fine PM (PM2.5) and ultra-fine (UFP) exposure of special concern. Prior

studies indicated that aircraft emissions from major airports could have significant impacts on neighboring communities, but were not able to quantify the extent of nearby PM exposures, nor the extent of health concern. This is because the methods used could not assess UF PM, and could not distinguish aircraft emissions from other combustion sources such as traffic arteries and nearby industrial sources. This study used near-real-time monitoring equipment at the Los Angeles International Airport (LAX) and in the nearby community to determine levels of UFP, black carbon, and PM2.5 emitted from aircraft. Aircraft activity at LAX was found to contribute pollutants to the downwind community.